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Role of Financial Sector Development as a Contingent Factor in the Remittances and Growth Nexus: A Panel Study of Pacific Island Countries

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Abstract

Except for emergencies and for technical assistance for raising skills and institution building, foreign aid to Pacific island countries (PICs) for budgetary support has been phased out since the late 1990s. Because of the small sized domestic markets, foreign direct investment (FDI) is small and is confined to development of tourism infrastructure. On the other hand, inward remittances received from the rising number of islanders migrating overseas for work are increasing, far exceeding aid and FDI. However, influence of remittances on economic growth depends on financial sector development (FSD) for mobilizing the savings from the remittance receipts for domestic investment. This paper assesses the role of FSD in the nexus between remittances and economic growth through a panel study of five major PICs, namely Fiji, Samoa, Solomon Islands, Tonga and Vanuatu. The study findings show that the ongoing efforts for strengthening FSD have to be stepped up by focusing on financial inclusion through spread of branchless banking and promotion of information and communication technology.

Keywords: Remittances; financial sector development; output; Pacific Islands.

JEL Classification: F24, P43, O40, C13, N17

Introduction

World-wide remittances from migrants working and resident overseas to families left behind in their home countries rose by about 82 percent

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from US$330 billion in 2006 to US$ 598 billion in 2015[1]. Annual remittances received by the developing countries have increased by 89 percent from US$ 229 billion in 2006 to US$ 440 billion in 2015. During the ten year period (2006-2015), at least two Pacific island countries (PICs)[2], have always been in and out in the list of the 10 top most remittance recipient countries, in terms of percentages of their respective gross domestic products (GDP). Remittances have now taken a lead over the two non-debt creating transfers: foreign aid, known as official development assistance (ODA) and foreign direct investment (FDI). While except for emergencies such as relief assistance and rehabilitation measures in the aftermath of natural disasters including cyclones, foreign aid for budgetary assistance has been phased out by late 1990s' and FDI is confined to tourism sector, as manufacturing-related investments were not attractive because of the smallness of domestic markets of PICs.

In last two decades, notably from the early 2000s, steadily rising inward remittances sent by increasing number of migrant Pacific islanders residing and working in the two metropolitan countries Australia and New Zealand, and North America and Europe have become a substantial support. Besides supplementing domestic savings, remittances are additions to real resources of the country, as they are in the form of foreign exchange, which would have to be earned under normal circumstances by stepping exports of a limited range such as coconuts, tropical fruits and vegetables and fish. According to conventional wisdom, the nexus between remittances and growth is mainly through consumption by recipient families, stepping up domestic aggregate demand. No doubt, increases in consumption expenditures on food, clothing and medicines and children's education were facilitated by remittance inflows, alleviating poverty

[1] According to World Bank's latest update (World Bank 2017, remittance inflows worldwide have been on the decline after reaching the peak in 2014 at US$ 598 billion. They declined to US$ 583 billion in 2015 and to US$ 575 billion (estimate) in 2016. The decline by 2 percent is the first drop in global remittances since 2009, which witnessed the onset of American financial crisis, soon deteriorating into global recession. The decline in remittances in 2015 was attributed to lay-offs by the oil companies in the Gulf countries due to the continuing fall in oil prices since 2013. However, World Bank (2016a) has forecasted that with the advanced economies recovering from recession and their shortages of skilled and unskilled farm labour, the rising trend in global migration from the developing to the developed countries is not likely to be reversed.

[2] The 14 Pacific island countries (PICs) are: Cook Islands, Fiji, Kiribati, Republic of Marshall Islands, Federated States of Micronesia, Nauru, Niue, Palau, Papua New Guinea (PNG), Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu. Among the 14 PICs, PNG is an outlier as its land area, population, abundant natural resources with oil and natural gas and other minerals place the country far ahead of the other 13 countries in terms of high growth potential. Hence, our study leaves out PNG from the study focus.

to a greater extent. However, steady annual inflows of remittances in the absence of any avenues for savings mobilization in rural areas, which have no access to banks and other savings institutions, tend to get frittered away on needless and avoidable consumption.

If there were opportunities for savings by way of access to banking services, additions to reserves in banks would have enabled recycling of remittance moneys as credit to the prospective domestic investors in domestic small and medium enterprises. There has been a growing body of empirical literature on interrelationship between financial sector development and remittances and growth[3]. Bettin and Zazzaro (2012) and Giuliano and Ruiz-Arranz (2009) in their panel studies about 100 developing countries concluded that in financially deeper systems, the growth effects of remittances are likely to be enhanced confirming the hypothesis of a complementary relationship of remittances with financial flows into growth enhancing investment areas. On the other hand, Chowdhury (2016) in his study on 33 developing countries came to an opposite conclusion that although remittances were found to be effective in promoting economic growth, financial sector development neither works as a substitute nor is a complement in the remittance–growth nexus and that the influence of financial variables on growth was found to be insignificant.

There have been a few studies on the Pacific, including one regional study by Browne and Mineshima, 2007 and individual country studies (Jayaraman et al, 2009, 2010 and 2016) and Rao and Takirua, (2010). However, none of them focused on FSD as a contingent factor in the remittances and growth nexus. This paper makes an attempt to fill the gap by undertaking a panel study of five major PICs: Fiji, Samoa, Solomon Islands, Tonga and Vanuatu for investigating the role of FSD in the remittances and growth nexus. The choice of the five PICs study is dictated by following reasons: Firstly, these five PICs are small sized countries with consistent and reliable database required for about 18 years to conduct a panel study. Secondly, the five PICs selected for the study share many commonalities which include a population of less than a million each; with significant absence of mineral resources; a very narrow range of exports comprising similar agricultural products such as coconuts, tropical fruits and vegetables, competing for the same markets. The major PIC, Papua New Guinea which has also rich data base is excluded from the study as an outlier because of its large

[3] Notable studies include Aggarwal, Demirguc-Kent and Peria (2011), Ali-Yousif (2002), Bang. Mitra and Wunnava (2015), Bettin and Zazzaro (2012), Chowdhury (2016), and Giuliano and Ruiz-Arranz 2009).

population (7 million) in the region as well as its rich endowments of mineral resources and a more diversified export base.

The paper is organized as follows: the next Section II gives a brief review of literature on remittances and growth with special reference to role of FSD; Section III presents the trends in remittances in PICs; Section IV outlines the empirical model and data sources; Section V discusses the results while Section VI is a summary with conclusions and policy implications.

Review of literature on remittances and growth

Remittances, known as cross-border transfers of earnings[4] are sent by migrants to their countries of origin. These are channeled through official and unofficial channels and they have grown over the last three decades. The official channels are through formal banking systems and authorized money-transfer agencies. It is estimated nearly 50 percent of remittances received in Sub-Saharan Africa were through unauthorized channels (World Bank, 2011). The global average transaction cost of remitting, say US$ 200 was 25 percent two decades ago; it has now come down to 10 percent in 2010. Although the average cost has further decreased to 7.4 percent in the last quarter of 2015, it is still higher than the targeted rate of 3 percent by 2030 (World Bank, 2017), as one of the UN Sustainable Development Goal Indicators (World Bank, 2016b). The reason has been found to be the continuing ease of sending money through unauthorized channels, which are far expensive.

The World Bank (2011; 2016c) reports that remittances from migrants (who are estimated to be more than 250 million, which is 3.4 percent of the world population in 2015) to developing countries have grown from US$69 billion in 1990 to US$132 billion in 2000, and US$332 billion in 2010 and reached US$440 billion in 2015. Remittances have now emerged to be the most important source of external finance to developing countries, about 40 percent of which go to rural communities in the recipient countries. Further, it has been noted by United Nations Conference Trade and Development (Mashayekhi, 2014) that remittances grew faster than FDI and ODA during a ten year (2003-2012) period.

Positive and negative impacts of remittances on growth have now been well documented. The evidence gathered suggests that with appropriate policies and remedial measures negative impacts can

[4] The World Bank (2016a) has introduced a new definition of remittances since April 2016. Remittances have three categories: (i) personal transfers; (ii) employees' compensation less taxes social contributions, transports and travel; and (iii) capital transfers between households.

be more than offset. Empirical evidence gathered during last two decades, by country specific studies and panel studies (Stahl and Habib, 1989; Adleman and Taylor, 1990; Leon-Ledesma and Piracha, 2001; Edwards and Ureta, 2003; Page and Adams, 2003; Hildebrandt and McKenzie, 2005; World Bank 2006; Yang 2008 *;* Bettin and Zazzaro, 2012; Giuliano and Ruiz-Arranz, 2009*)* have established the positive consequences of remittances, as they (i) supported the welfare of the families left behind, thereby alleviating their poverty; (ii) helped the recipient families to upgrade their dwellings and undertake investments towards improving their farming operations; (iii) enabled families to pay education fees for children and bear expenses of medical care of the elderly; and (iv) added to the foreign reserves of the recipient country , thereby raising the level of its credit worthiness for undertaking growth enhancing investments with loans from international funding agencies.

The negative impacts have been noted to include (i) encouraging greater migration possibilities of skilled manpower, thereby leading to brain drain; (ii) inducing consumption of imports of luxury goods and avoidable trade deficits; and (iii) higher demand for non-tradables such as electricity and water, pushing up the domestic price level, raising the real exchange rate and thereby hurting the competiveness of limited range of exports. The remedial measures include appropriate investments in domestic water supply, electricity generation and other infrastructures by utilizing the foreign exchange resources brought in by remittance inflows (Jayaraman et al., 2016).

Role of Financial sector development

The developmental impact of remittances can be enhanced only when savings made by recipients out of their remittances are mobilized by financial sector institutions for recycling them as credit. In the absence of access to savings institutions, families in the rural parts of developing countries, which are reported to receive about 40 percent of remittances (Mashayeki, 2015) tend to fritter away their savings on avoidable consumption. Since only 50 percent of adults (15 years plus) have been found to have an account with a formal financial institution, most of the recipient families in rural areas, face challenges in accessing financial services, in terms of basic payment, savings and insurance services as well as access to credit for undertaking small enterprises in informal sector. Further, women and youth lag behind as only 47 percent of women and 37 percent of youth have a formal account. Furthermore, in developing countries only 34 percent of firms have a bank loan as compared to 51 percent in developed countries. Nearly 80 percent of microenterprises and

Table 1. Remittances and Other Resource Inflows to Developing Countries, Small States and Pacific Island States 1990-2015 (US$ bill)

	1990	1995	2000	2001	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
World														
Remittance	67.9	102.4	491.0	515.0	330.7	398.6	460.2	429.4	463.7	525.3	547.0	572.3	592.9	601.3
Developing Countries														
Remittances	289.3	53.9	79.4	89.1	228.6	279.5	324.8	302.9	335.7	377.9	400.7	416.2	431.1	440.5
FDI	19.1	86.1	136.5	156.8	361.3	480.2	540.9	385.2	528.1	630.5	582.7	671.3	661.8	NA
ODA	55.4	56.5	49.1	51.6	105.4	104.9	122.8	120.9	120.6	134.7	126.9	135.1	135.2	NA
Developing Small States														
REM	1.4	1.9	2.4	2.7	4.9	5.6	6.5	5.9	6.5	7.4	7.5	7.1	7.0	NA
FDI	0.9	2.5	5.7	59.0	22.7	25.3	35.0	23.4	62.7	0.7	26.3	-2.0	15.3	NA
ODA	2.4	2.3	1.6	1.6	2.3	2.9	3.8	3.7	4.1	3.9	3.7	3.7	3.2	NA
Developing Pacific Small States														
REM (US$ mill)	102.3	87.4	128.0	238.0	429.4	444.3	411.6	447.4	476.4	501.8	595.8	603.7	580.2	NA
FDI (US$ mill)	123.6	107.3	161.5	309.7	528.8	565.1	521.9	257.3	581.4	615.9	409.0	354.8	534.0	NA
ODA (US$ mill)	247.4	501.3	408.9	447.5	620.6	649.9	661.4	756.2	903.5	1052.1	1044.8	1033.7	870.3	NA

Source : World Bank 2016b and 2016c. Note: NA = Not available

small and medium enterprises in the informal sector do not have access to bank credit and they are forced to seek funds at high interest rates from outside the formal financial sector (Mashayekhi, 2015).

Recognizing the need for promoting greater access to financial services, the United Nations (UN) has included in its post -2015 Development Framework [5], financial inclusion, as a major goal, besides other goals. Financial inclusion is defined as "effective access and use by individuals and firms of access of affordable and sustainable financial services from formal providers" (United Nations Conference on Trade and Development, 2015: 1). Empirical studies incorporating FSD as a variable in their studies on remittance-growth nexus (Calderon *et al.* 2008; Ramirez and Sharma, 2008; Giuliano and Ruiz-Arranz, 2009; Nyamongo *et al*. 2012; Bettin and Zazzaro, 2012) employed quantity-based indicators. These are: ratio of liquid liabilities of the financial system to GDP; ratio of domestic credit provided by the banking sector to GDP; ratio of bank deposits to GDP; and ratio of claims on private sector to GDP.

A major proportion of evidence assembled by these studies shows that remittances act as substitute. In countries, where domestic credit markets are weak, the households with no access to FSD institutions for loans are often forced to borrow from money lenders by pledging properties such as farm land or house as collaterals or to borrow at a large premium over the risk adjusted interest rate [6]. Referring specifically to the substitutability hypothesis, Giuliano and Ruiz-Arranz (2009) make it clear that there cannot be any *a priori* conclusion about the interaction between remittances and FSD and that it has to be tested by an econometric study[7].

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[5] Mashayeki (2014) notes that financial inclusion is an important element of the UN post-2015 Sustainable Development Goals: (i) contributionto poverty reduction and economic development (target 1.4); (ii) recognition of role of agriculture (target 2.3); (ii) general support to economic growth and job creation and innovation(target 8.3); (iii) stepping up infrastructure (9.3); (iv) promotion of inclusiveness of the poor and vulnerable (target 1.4); (vi) encompassing women(target 5a); (vii) formalization and growth of micro and small and medium enterprises (8.3); and (viii) enhancement of importance of financial institutions (target 8.10) .

[6] In those cases, where the borrowers have no collaterals such as land or house, pledge their future remittances as collaterals (Paulson and Townsend, 20). Well functioning FSD institutions do allow remittance recipient families, if they show evidence of regularity in remittance inflows, to open and operate bank accounts. They provide loan assistance by having future remittance receipts as collaterals for undertaking productive investments in micro-enterprises (Freund and Sapatafora, 2008).

[7] If the coefficient of the interaction term as an independent explanatory variable along with other relevant variables in a regression analysis with real GDP as dependent variable turns out with a positive sign and is found significant, one can conclude

Evidence gathered by various studies find the existence of predominant support in favour of the hypothesis of substitutability between remittances and loan finance. These studies include those on Latin American and Caribbean countries: Calderon *et al.* (2008); Ramirez and Sharma (2009); Barajas *et al* (2009) and Bettin and Zazzaro (2012). However, Bettin and Zazzaro (2012) argue by quoting the findings of Nyamongo et al. (2012) and Zouheir and Sghaier (2014) observe that there is a contradicting piece of evidence in regard to relationship between remittances and financial development. In African countries, where financial sector is weak, the two variables are seen as complements, strengthening the positive impact of remittances on growth, rather than mitigating it. As remittances can be deposited in banks, they bring a larger share of the population in contact with the financial sector, expanding the availability of credit (Aggarwal et al., 2011). In a more recent panel study on 33 countries, Chowdhury (2016) concluded that although remittances on their own were found to be effective in promoting economic growth, the influence of financial variables on growth was found to be insignificant on growth, and that financial development neither works as a substitute nor a complement in the remittance–growth nexus.

Trends in Remittances and Financial Sector Development in PICs

This section focuses on the selected five major PICs namely Fiji, Samoa, Solomon Islands, Tonga and Vanuatu. The key economic indicators of the five PICs are given in Table 2.

While ODA inflows have been declining both in absolute amounts as well as in percent of GDP in recent years due to recession in donor countries as well as changes in donor priority considerations, the rise in the other unrequited transfer of resources, has attracted attention and received approval by governments in PICs. Tables 3 and 4 reveal that the remittances from the islanders of PICs resident overseas have proved more reliable than ODA.

It may also be seen that Samoa and Solomon Islands have received more foreign aid, in terms of percentages of GDP, than other PICs in certain years. They were for the humanitarian purposes, which are of emergency nature. Foreign aid for Samoa was for both immediate relief in terms of cash and donations in kind after the cyclones as well as for implementation of long term cyclone rehabilitation measures. Solomon Islands received assistance from Australia and New Zealand

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remittances and FSD are complements to each other. On the other hand, if the sign emerges with a negative sign and is significant, the interpretation would be remittances and FSD act as substitutes; and in case the coefficient is not found significant, the conclusion would be that the two are independent of each other.

for improving its police and judicial administration and related components for restoring peace and maintaining law and order, which were badly affected by the ethnic riots of 2004. The aid received was well over US$ $2.6 million until 2016.

Table 2. PICs: Selected Key Indicators

	Fiji	Samoa	Solomon Is.	Tonga	Vanuatu
Land Area (sq.kms)	18,270	2,849	27,540	748	12,200
Population ('000)	892	197	467	106	273
GDP per capita (US$): 2014	5046	4179	2090	4192	5148
Aid per capita (US$): 2014	104	483	346	756	380
Remittances (US$): 2014	236	733	28	1082	109
Annual ave. Growth Rate (2010-14)	3.7	1.1	5.4	1.2	1.6
Annual average Inflation (2010-14)	3.3	1.6	4.9	2.7	1.3
Budget Bal (% of GDP) 2010-14	-2.4	-5.3	4.9	-3.3	0.4
Current Account Bal (% of GDP) 2010-14	-5.7	-0.9	-11.7	2.9	-4.4

Table 3. PICs: ODA and Remittances (percent of GDP)

	1980 -89	1990 -99	2000-04	2005 -09	2010	2011	2012	2013	2014
Fiji									
ODA	3.27	2.85	1.95	1.87	2.51	2.15	2.80	2.22	2.12
Remittances	1.66	1.55	4.95	5.73	5.33	4.25	4.8	4.85	4.62
Samoa									
ODA	NA	10.58	11.27	9.56	23.12	13.91	15.73	15.49	11.96
Remittances	25.09	21.83	16.61	17.93	21.09	20.95	22.10	20.68	17.55
Solomon Islands									
ODA	24.35	14.64	17.62	46.93	68.57	50.47	32.74	27.42	18.05
Remittances	NA	0.49	1.34	2.03	2.13	1.91	2.02	1.95	1.41
Tonga									
ODA	23.52	16.56	11.10	9.82	18.45	20.59	16.68	18.28	18.20
Remittances	23.14	18.1	31.15	27.16	20.89	17.84	25.72	27.95	26.29
Vanuatu									
ODA	29.97	20.19	12.65	13.27	16.02	11.80	13.82	11.40	12.07
Remittances	6.63	7.61	7.47	1.37	1.68	2.75	2.82	2.96	3.45

Source: World Bank (2016). Note: NA = Not Available

Under the ongoing negotiations for a regional free trade agreement in goods and services, and labour mobility known as Pacific Agreement on Closer Economic Relations (PACER) between Australia and New Zealand and 14 PICs, both Australia and New Zealand began to explore since 2001 the possibility of meeting seasonal shortages of agricultural labour in their farms by importing labour from PICs. Studies on seasonal migration schemes for unskilled citizens of PICs (World Bank, 2006; Browne and Mineshima, 2007), which were introduced in the mid 2000s by Australia and New Zealand on an

Table 4. PICs: ODA and Remittances (US$ million in current prices)

	1980-89	1990-99	2000-04	2005-09	2010	2011	2012	2013	2014
Fiji									
ODA	55	61	51	69	89	91	123	104	104
Remittances	24	35	128	218	202	185	218	231	236
Samoa									
ODA	161	248	195	269	793	545	638	620	483
Remittances	166	240	303	541	744	851	941	864	732
Solomon Islands									
ODA	136	127	153	439	648	631	555	514	347
Remittances	NA	NA	11	22	27	31	38	37	29
Tonga									
ODA	189	295	219	292	677	897	747	772	756
Remittances	158	223	625	811	743	752	1123	1150	1081
Vanuatu									
ODA	253	245	182	306	458	375	410	359	380
Remittances	62	103	106	32	50	90	89	94	109

Source: World Bank (2016). Note: NA = Not Available

experimental measure for a select few PICs showed promising potential. These schemes are known as Recognized Seasonal Employer Scheme (RSE) by New Zealand from 2008 and Seasonal Worker Programme (SWP) by Australia from 2012. While RSE focuses on labour for horticulture activities mainly for picking up fruits and related activities, SWP covers horticulture and unskilled work in other agriculture related activities and in tourism sector as well. These schemes have proved beneficial to both parties. They help Australia and New Zealand to overcome chronic shortages of labour to work on their orchards; and they enable the immigrant workers on temporary work permits come, earn and send back some money to the families left behind. Almost 12,000 workers from PICs have been estimated to have been employed under these two schemes so far (World Bank 2016d). One of the continuing hurdles faced by migrants from PICs is the persisting high cost of sending remittances. The World Bank study (2016d) observes PICs are some of the most expensive countries, when it comes to sending remittances to them. The average cost is 11.5 percent, which had remained steady for past five years compared to the global average of 7.5 percent (Betteridge and Howes, 2015).

Remittances have been found to be a boon for households in PICs just as elsewhere since they have been supplementing disposable incomes of the recipient families (Chami and Fullenkamp, 2013). The funds received are spent on consumption of clothing, food, medicine and shelter. They have also enabled the remittance receiving families to invest in education of children and meeting health care expenses, besides investments in semi durable goods. Remittances are now seen increasingly playing a supportive source of funds to enterprising families. They help the small scale rural entrepreneurs undertake

simple food processing microenterprises such as pickles, chutney and condiments for local urban markets. Thus, these families look upon remittances as a source of funding new production opportunities for commercial purposes by investing in micro-enterprises.

Table 5. PICs: Average Transaction Cost of Remittances (percent)

	2011	2012	2013	2014	2015
Fiji	13.6	11.0	10.8	9.8	9.0
Samoa	12.2	12.5	10.6	11.1	9.3
Solomon Islands	15.4	NA	NA	NA	NA
Tonga	12.9	12.1	11.2	11.9	9.6
Vanuatu	13.3	11.2	12.0	13.7	10.0

Source : World Bank (2016) Note: NA = Not Available

As remittances relax credit constraints imposed by undeveloped financial sectors, governments realize immense potential of remittances in triggering entrepreneurial efforts. Therefore, they are now encouraging financial institutions to help in channeling remittance inflows through formal banking channels. Banks have been responding in turn by opening more branches in urban areas as well as new branches in rural areas and by introducing mobile banking in inaccessible areas. These efforts are expected to facilitate enhanced financial development by realizing greater economies of scale in financial intermediation.

Financial Sector Development

All the five PICs under study have independent currencies of their own and have fixed exchange rate regimes. The financial sector in each of the five PICs comprises a central bank set up as a statutory authority for controlling money supply and for regulating and supervising the commercial banks and other credit institutions, government owned development banks and state sponsored pension funds. With experiences gained from the failed indigenous banks in PICs two decades ago, the banking regulations and supervision standards have been brought up to international standards. Most of the banks are foreign owned and are also subject to control and supervision from their headquarters. Consequently, loan applications are subject to stricter appraisal standards. This has given rise to criticism that commercial banks were more concerned with safe and secure loans for projects in industrial and housing projects, rather than in agriculture development projects, for which collaterals are not readily available because of the unique communal land ownership/tenure system restricting individual ownership of lands. Further, commercial banks have themselves have been on the defensive mode, resulting in a high spread between average deposit and lending rates,

consequently excess liquidity finding its way into safe investments as government bonds.

In recent years, administrative measures were introduced by PICs for reducing the spread by requiring banks to publish disclosure statements on their income and expenditure statements and laying down the spread margin not more than certain prescribed percent. Further, banks have been persuaded to open more branches in rural areas and operate banks on wheels to reach unbanked public in remote parts rather than being confined to accessible urban centers where most of the commercial activities and tourist operators are located.

Table 6 presents financial sector development indicators. The indicators are broad money (BM), quasi-money (savings and time deposits) and credit by banks to private sector, all as percentages of GDP during 21 year period (1997-2014) in five PICs. Table 7 presents Financial Inclusion Indicators for three PICs. They are based on the completed surveys conducted by the central banks with the UN assistance. The survey results are partial, as the two PICs namely Tonga and Vanuatu have not been completed so far.

Table 6. PICs: Financial Indicators (percent of GDP)

	1997-2000	2001-2005	2006-2010	2011	2012	2013	2014
Fiji							
BM	41.7	52.2	68.5	69.5	69.8	80.6	83.1
QM	26.1	33.3	45.2	38.4	39.0	29.7	30.6
PSC	30.2	42.4	63.2	60.0	60.6	64.2	69.2
Samoa							
BM	25.0	27.5	40.6	40.4	38.1	40.6	43.9
QM	16.7	19.5	29.0	27.8	26.0	27.4	29.1
PSC	18.7	23.3	37.5	39.7	38.7	39.4	44.5
Solomon Islands							
BM	19.9	22.8	36.1	38.5	40.6	44.5	42.5
QM	9.3	9.4	13.0	10.9	8.9	9.6	11.5
PSC	8.6	9.7	23.6	18.0	16.8	18.8	19.9
Tonga							
BM	33.2	41.5	45.5	40.1	43.9	46.3	48.3
QM	20.6	24.1	30.5	26.5	22.3	21.2	16.5
PSC	40.8	44.9	48.8	32.8	30.3	29.7	29.7
Vanuatu							
BM	98.3	94.6	92.9	80.8	78.6	70.9	71.9
QM	83.7	66.3	59.7	49.2	47.4	36.0	38.3
PSC	32.5	37.8	52.9	67.1	70.2	68.5	71.5

Note: BM = Broad Money; QM= Quasi Money; and PSC: Bank Credit to Private sector.
Source: IMF, ADB and Authors' Calculations

Table 7. PICs: Financial Inclusion Indicators

	Fiji	Samoa	Solomon Islands
Land Area (sq.km)	18,270	2,830	27,539
Adults Population ('000)	615,800	115,900	306,590
Density (adults per sq.km)	34	41	11
Financial Inclusion (% of adults)			
Excluded	27	34	31
Included	73	66	69
Banked	60	39	26
Other formal	4	12	8
Informal	9	15	35
Access: No. Service points per 10,000			
Bank Branches	1.17	1.92	0.46
ATMs	4.64	3.51	1.27
Mobile Phones with subscription (% of adults)	75	71	62
Average cost of travelling to nearest access point (US$)			
Bank Branch	3.33	2.2	19.08
ATM	2.06	2.9	13.5
Bank agent	2.25	2.1	15.03
Post Office	1.52	2.5	13.34
Ave. time of travelling to nearest point (US$)			
Bank Branch	46.2	44.8	291.6
ATM	22.8	23.7	237.7
Bank agent	21.9	14	91.9
Post Office	23.8	24.6	159.6
Persons with at least one type of deposit account (%)	60.2	39	27.3
Persons with at least one type of credit account (%)	9.4	13.4	3.9
Persons using mobile fin. service for person to person	1.4	0.7	4.3
Transfer and bill payment in the last 12 months (%)			
Persons receiving money (including e - money) through mobile money in last 12 months (%)	2.1	2.7	3.3
Women with an active deposit account (%)	43.7	35.1	16.6

Source: Reserve Bank of Fiji (2016).

Data, Methodology and the Model

Modeling

The empirical model to assess financial sector development's impact on the remittances-income nexus in Pacific Island countries takes the following panel data structure:

$$Y_{it} = \beta_0 + \beta_1 K_{it} + \beta_2 RM_{it} + \beta_3 FSD_{it} + \beta_4 RM_{it} FSD_{it} + \varepsilon_{it} \qquad (1)$$

where, the notations would indicate:

Y_{it} = natural logarithm of real GDP per capita (US$);

K_{it} = natural logarithm of capital stock per capita (US$);

RM_{it} = remittances (% of GDP);

FSD_{it} = FSD indicator (broad money, quasi money or credit by banks to private sector as % of GDP),

$RM_{it}FSD_{it}$ =interaction between RM and FSD indicator

Subscripts *i* and *t* stand for number of countries and time periods respectively. $\beta_1, \beta_2, \beta_3,$ and β_4, denote slope coefficients and ε_{it} is the regression error term. Explanatory variables in Equation (1) and their expected roles in PICs economic growth are explained as follows:

1) Capital stock per capita (K_{it})

   The hypothesis to be tested is that capital stock per capita is positively associated with per capita output.

2) Remittances (RM_{it})

   Remittance by promoting demand for goods and services and by adding to bank reserves as savings, and hence increasing domestic credit are expected to step up output. The hypothesis to be tested is remittances are positively associated with per capita output.

3) FSD (FSD_{it})

   FSD indicator represents financial deepening. The indicator chosen for the study is broad money, which is the sum of currency and demand deposits plus time and savings deposits as percent of GDP. As increases in *BM* lead to greater liquidity in banks, thereby enabling them to step up lending, we expect a direct relationship with growth in output per capita.

   The hypothesis to be tested is that *BM* is directly associated with rise in per capita output.

4) Interaction between remittances and FSD ($RM_{it}FSD_{it}$)

   As there cannot be any *a priori* conclusion about the interaction term, since the sign of the coefficient of the interaction is

uncertain, no hypothesis is posited. If *RM and BM* mutually support growth and hence happen to be complements, the sign of the interaction term would be positive and significant. On the other hand, if the sign is negative and significant, the interpretation would be *RM* and *BM* are substitutes; and if the coefficient of the interaction term is not significant, the conclusion would be that the two are independent of each other in their contribution to output growth.

Data

The above model is estimated based on a sample of five Pacific Island countries (Fiji, Samoa, Solomon Islands, Tonga and Vanuatu) over 1997-2014. The capital stock employed utilised for the study was built up by perpetual inventory method[8]. All other data are sourced from *World Development Indicators,* (World Bank 2016).

Methodology

This study employs panel data methodology. According to Baltagi (1985), the use of panel analysis enables the researcher to overcome the problems of heterogeneity and serial correlation. A technical appendix (Appendix 1) presents in brief panel estimation various techniques with a comparison among the long run estimators.

Results and Interpretations

As a first step, the panel unit root tests were conducted to investigate the stationarity properties of the time series of data proposed to be employed. The results of Levin-Lin-Chu (LLC) test, Im-Pesaran-Shin (IPS) test and the Fisher ADF test are shown in Table 8. The test results showed that null hypotheses of unit roots for all the variables could not be rejected at levels. However, the reverse holds when tests were conducted at their first differences. This implies that all variables are integrated at first order, I (1). As the variables are stationary at the first difference, we then proceeded to test the long run relationship among the variables using Pedroni and Kao cointegration tests. Table 9 shows the results of Pedroni and Kao tests for cointegration. The results of Pedroni test confirm the cointegration among the variables in the long run. Similar outcome is obtained by Kao test as well.

[8] The assumptions behind the calculations were: (i) capital-output ratio of 5; and (ii) depreciation rate was 4%, GDP in 1980 was used as benchmark value at 2010 prices.

Table 8. Panel Unit Root Tests

	LLC		IPS		Fisher ADF	
	Level (trend and intercept)	First difference (intercept)	Level (trend and intercept)	First difference (intercept)	Level (trend and intercept)	First difference (intercept)
Y	-0.0306	-2.0662**	-0.1523	-1.6282*	9.8313	16.0939*
	(0.4878)	(0.0194)	(0.4394)	(0.0517)	(0.4554)	(0.0970)
	(0)	(1)	(1)	(1)	(1)	(1)
K	1.7171	-2.2864**	2.6494	-1.6694**	1.2826	16.3428 *
	(0.9570)	(0.0111)	(0.9960)	(0.0475)	(0.9995)	(0.0902)
	(0)	(3)	(0)	(1)	(0)	(1)
RM	-1.1542	-4.9625***	0.4142	-3.5411***	6.9089	30.3285***
	(0.1242)	(0.0000)	(0.6607)	(0.0002)	(0.7340)	(0.0008)
	(1)	(1)	(1)	(1)	(1)	(1)
BM	-0.0560	-4.0693***	0.4739	-3.6129***	6.2864	31.119***
	(0.4777)	(0.0000)	(0.6822)	(0.0002)	(0.7906)	(0.0006)
	(1)	(1)	(1)	(1)	(1)	(1)
RMBM	-0.7234	-4.9133***	0.7709	-3.4945***	5.4761	29.919***
	(0.2347)	(0.0000)	(0.7796)	(0.0002)	(0.8572)	(0.0009)
	(1)	(1)	(1)	(1)	(1)	(1)

Note: LLC, IPS, and Fisher ADF indicate the Levin et al. (2002), Im et al. (2003), Maddala and Wu (1999) panel unit root and stationary tests. All three tests examine the null hypothesis of non-stationary. *, ** and *** represent the rejection of null hypothesis at 10%, 5% and 1%. The figures within bracket are test statistic value, the first bracket shows the probability value, while the subsequent bracket shows the lag length selected based on SIC. The probability values for the Fisher ADF are computed using asymptotic χ^2 distribution, while the rest follow the asymptotic normal distribution.

Table 9. Panel Cointegration tests

Pedroni	
Panel cointegration statistics (within-dimension)	
Panel v-statistic	-1.4225 (0.9226)
Panel rho-statistic	0.9500 (0.8290)
Panel PP-statistic	-2.5181*** (0.0059)
Panel ADF-statistic	-2.4740*** (0.0067)
Group mean panel cointegration statistics (between-dimension)	
Group rho-statistic	1.9088 (0.9719)
Group PP-statistic	-4.2082*** (0.0000)
Group ADF-statistic	-2.5330*** (0.0057)
Kao	
ADF	-1.4220* (0.0775)

Note: Both tests examine the null hypothesis of no cointegration for the variables. * and *** indicate the rejection of null hypothesis at 10% and 1%. The figures without bracket represent test statistic values. Probability values are shown in the bracket. The lag length is selected automatically based on SIC.

Having confirmed the existence of a long run cointegration, dynamic ordinary least square (DOLS) procedure was applied. Table 10 reports the results of pooled DOLS estimation. The results reveal that capital

per capita increases GDP in the long run. It is shown that 1 percent increase in capital will lead to a 0.483 percent rise in real GDP per capita. Similarly, the coefficients of RM and BM, which are elasticities are also positive and significant, indicating that both remittances and BM contribute to economic growth. For the case of remittances, it is found that 1 percent increase in the variable will cause the economy to grow by 0.421 percent.

The results of a positive long run relationship between remittances and economic growth are supported by the previous studies such as Bettin and Zazzaro (2012), Edwards and Ureta (2003), and Giuliano and Ruiz-Arranz (2009). One percent increase in BM will increase real GDP per capita by 0.152 percent as shown by the value of coefficient. However, the coefficient of interaction term between remittances and bank credit is found to be negative and significant.

The finding that the interaction term is negative confirms the general finding by other similar studies by Ramirez and Sharma (2009) and Gapen et al. (2009) in developing countries in other regions that remittances and FSD are substitutes.

Table 10. Panel pooled DOLS

Independent variable	Coefficient (p-value)
K	0.4835***
	(0.0034)
RM	0.4211**
	(0.0193)
BM	0.1523**
	(0.0469)
RM*BM	-0.1079**
	(0.0236)
Adjusted R^2	0.9962
S.E. of regression	0.0273

Notes: Dependent variable is Real GDP per capita. Automatic leads and lags are selected based on AIC criterion. The figures without bracket indicate the coefficient estimates while the figures in brackets show the probability value. **, *** represent the significance level at 5% and 1%.

Threshold level of FSD

We adopt the procedure employed by Hermes and Lensink (2003) for deriving the threshold level of BM, which is the indicator of FSD. As Y, RM and BM are in natural logarithms, we use the differential of Y with respect to RM and interactive term of RM and BM and equate its first order derivative to zero for determining the threshold levels of BM

required for RM to contribute to economic growth. We calculate the threshold level as shown below:

$\Delta Y/\Delta RM = 0.421\text{-}0.108\ BM$

The threshold value of BM is determined as 0.421/0.108 =3.901. The exponential value of the natural logarithm will give us the actual percentage that would be the pre-required level of BM. The threshold level BM is: 49.45 percent of GDP.

Similarly, we derive the threshold level of RM.

$\Delta Y/\Delta BM = 0.152\text{-}0.108\ RM$

The threshold value of RM is determined as 0.152/0.108 =1.41. The exponential value of the natural logarithm will give us the actual percentage that would be the pre-required level of RM. The threshold level RM is: 4.10 percent of GDP

Since the coefficient of the interaction term between RM and BM has a negative sign, the indications are that marginal output effects of remittances and broad money are respectively reduced by their interaction. Remittances' marginal effect on output turns negative if BM exceeds 49.45 percent of GDP. Similarly, BM's marginal effect on output turns negative if remittances exceed 4.10 percent of GDP. This suggests that, when BM is higher than 49.45 percent of GDP and at the same time remittances are higher than 4.10 percent of GDP, any further increases in both indicators would actually lead to decline in output.

Conclusions with Policy Implications

The PICs have been among the world's top most remittances dependent countries. Their absorptive capacity to save and invest in growth enhancing economic activities is, however limited. The remittance recipient families tend to fritter them away on needless consumption mainly because of absence o access to financial sector institutions, most of which are mainly confined to capital cities and urban towns.

This paper carried out a panel study of five PICs, which shows that remittances as percent of GDP and financial sector development represented by broad money (BM) comprising demand deposits and time and savings deposits as percent of GDP, as independent explanatory variables are positively associated with the dependent variable namely per capita GDP; however, the interaction term emerged with a negative sign. The inference is financial sector development and remittances are not complementary to each other but they act only as substitutes.

This confirms that financial sector development has not yet reached the needed threshold level in PICs, which requires attention paid to the following policy conclusions:

- spread of banking habits through promoting the use of technological innovations for overcoming the hurdles faced by the urban-based commercial banks as well as other financial institutions to reach the rural population in the far and remote islands
- help to forge an effective public and private sector co-partnership in the introduction of inexpensive and affordable access to mobile phones and internet use for banking; and
- obtain technical and financial assistance from both multilateral and bilateral agencies for meeting the required infrastructural investments.

These measures would go a long way for ensuring that future remittance inflows are directed to better use, by weaning away from wasteful consumption and putting into savings and recycling them into productive domestic investment by encouraging domestic entrepreneurs seeking investible funds from the financial sector institutions. The use of mobile money and internet banking through promotion of information and communication technology would enable spread of brick-mortar less branches over the cyber space and eventual financial deepening and economic growth.

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Appendix 1

A brief explanation on Panel Study Procedures

Before employing the panel methodology, it is necessary to check the stationarity properties of the variables used in this study, since employment of non-stationary variables can lead to erroneous results. The study utilizes three panel unit root tests, namely the Levin-Lin-Chu (LLC) test developed by Levin et al. (2002), the Im-Pesaran-Shin (IPS) test suggested by Im et al. (2003) and the Fisher ADF test proposed by Maddala and Wu (1999). In recent years, there are specific panel unit root tests, which have been evolved over time. These tests have greater power than the normal time series unit root tests. The panel unit root tests are in fact multiple time series unit root tests built for the use of panel data. However, both the panel and time series unit root tests share the common null hypotheses and alternative hypotheses. The null hypothesis of all the three tests above is the existence of a unit root in the series, i.e. the variables are non-stationary. On the contrary, non-existence of a unit root (the variables are stationary) is the alternative hypothesis. If the variables in the series are stationary at first difference, then the existence of a long run relationship can be examined using panel cointegration tests.

Our study employs Pedroni (1999, 2004) and Kao (1999) tests (which are based on Engle-Granger (1987) cointegration test) to examine the residuals of a spurious regression performed using I (1) variables. Cointegration exists among the variables if the residuals are stationary at levels. However, the variables are said to be not cointegrated if the residuals are stationary at first difference. The Pedroni test comprises seven statistics to examine the null hypothesis of no cointegration in the heterogeneous panel.

In general, Pedroni test takes the following form:

$$y_{it} = \alpha_i + \delta^i t + \beta_{1i} x_{2i,t} + \cdots + \beta_{mi} x_{Mi,t} + \varepsilon_{i,t} \qquad \text{(A 1)}$$

t=1, …, T; i=1,…, N, m=1,…, M

where T represents the number of observation over time, N is the number of individual units in the model while M denotes the number of regression variables. Besides, y and x are assumed to be I (1). Here, α_i and δ_i are individual and trend effects that can be set to zero if preferred. $\varepsilon_{i,t}$ represents the residuals.

One of the following regressions can be employed to examine the integration of residuals obtained from equation (A1):

$$\varepsilon_{it} = p_i \varepsilon_{it-1} + \mu_{it} \qquad \text{(A2)}$$

or

$$\varepsilon_{it} = p_i \varepsilon_{it-1} + \sum_{j=1}^{p_i} \varphi_{ij} \Delta \varepsilon_{it-j} + v_{it} \quad \text{(A3)}$$

for every cross section. On the other hand, Kao test uses the same basic approach as the Pedroni tests. However, it specifies cross section specific intercepts and homogeneous coefficients on the first-stage regressors.

If cointegration is confirmed among the variables, the next step would be to use long run estimators to test the long run elasticity between the dependent variable, real GDP per capita, and all the explanatory variables. There are three commonly used estimators in the existing literature namely ordinary least squares (OLS), fully modified ordinary least squares (FMOLS) and the dynamic ordinary least square (DOLS). Among them, FMOLS and DOLS estimators have been more preferred in recent years than OLS estimator in recent years. It is due to the fact that FMOLS and DOLS estimators are able to get rid of the problems of endogeneity in the regressors as well as serial correlations in the error terms. However, DOLS is considered superior to FMOLS in the sense that DOLS eliminates the problems of endogeneity and autocorrelation using parametric approach but not nonparametric approach as adopted in the case of FMOLS.

Kao and Chiang (2000) who extended the use of DOLS estimator to panel data set concluded that DOLS is a better estimator than OLS and FMOLS for both homogeneous and heterogeneous panels after employing Monte Carlo simulations to compare the three estimators. They confirmed the role of leads and lags of the explanatory variables in reducing the biases of DOLS. Kao and Chiang (2000) developed the pooled DOLS estimator which utilizes OLS to estimate an augmented cointegrating regression as below:

$$y_{it} = \beta X_{it} + \sum_{j=-q_i}^{r_i} \Delta X_{it+j} \delta_i + \mu_{it} \quad \text{(A4)}$$

Where y_{it} and X_{it} are data removed from the individual deterministic trends. δ_i denotes the short run dynamics coefficients which are allowed to be cross section specific. Let Z_{it} be the regressors formed by relating the ΔX_{it+j} terms with cross section dummy variables, and with $W_{it}' = (X_{it}', Z_{it}')'$, the pooled DOLS estimator can be presented as follows:

$$\begin{pmatrix} \beta_{DP} \\ \gamma_{DP} \end{pmatrix} = \left(\sum_{i=1}^{N} \sum_{t=1}^{T} W_{it} W_{it}' \right)^{-1} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} W_{it} y_{it}' \right) \quad \text{(A5)}$$

Since among the three FSD indicators, broad money as percent of GDP (BM) fared the best among them, we report the estimated results of the model with BM.